Gardner Denver

Nitrogen Generation

for the Pharmaceutical Industry

Lifecycle SOLUTIONS

Pharmaceutical manufacture

Dependable solutions.

Compressed air technology from Gardner Denver can now help generate high-purity nitrogen, the latest addition to a long list of supported Pharmaceutical Industry applications that also includes process air, control valves and cylinders, material handling, air curtains, and product drying, to name just a few.

Nitrogen applications

Transfer

High-pressure nitrogen gas can be used to assist safe transfer of substances from one vessel to another. This highly effective solution speeds up the process without causing any dissolution or build-up of substances.

Purging

Manufacturing and analytical equipment can be purged with nitrogen gas to remove oxygen and water vapor from process lines, thereby increasing product quality and reducing the need for further conditioning treatments.

Analytical Testing

Gardner Denver's gas generators produce ultra-high-purity nitrogen specifically for use in analytical testing such as LC/MS, GC and nuclear magnetic resonance.

Nitrogen Purity

For blanketing and other inerting processes, nitrogen purity levels may be lower than those required for drug manufacture. Where finished products are exposed to a nitrogen-rich atmosphere, however, they must be carefully analyzed to check for any adulteration.

Blanketing

APIs and final drug products must be stored in the appropriate way to ensure humidity and oxygen do not affect the product and powders do not agglomerate. Blanketing with nitrogen provides an inert atmosphere that suppresses airborne contamination such as moisture and bacteria. Nitrogen will also provide a protective blanket that maintains quality by preventing contact between potentially reactive materials and oxygen.

Drug Manufacture

Nitrogen with a purity of 10ppm oxygen content delivered at a pressure of around 6.5 bar can be used during the manufacture of APIs and final drug products such as ophthalmics, LVPs and SVPs. Nitrogen supplied by Gardner Denver meets the following requirements:

- Nitrogen <10ppm oxygen content
- Carbon dioxide <1ppm
- Carbon monoxide <1ppm
- Water vapor <5ppm (-86.8°C dew point)
- Total hydrocarbons <5ppm

Aseptic Packaging

For many pharmaceutical products that cannot withstand any form of thermal sterilization, aseptic filtration followed by packaging in pre-sterilized containers in a cleanroom environment is the best solution.

Because aseptic filtration/ fill operations are complex, environmental controls are required to maintain standards. Nitrogen gas can be used to provide a suitable atmosphere and for filter integrity testing.

Convenient, on-demand nitrogen gas at consistently reliable purity levels for blanketing, API production, final drug product manufacture and packaging saves time and money."

Problems with typical nitrogen supply methods

Obtaining or maintaining a ready supply of nitrogen gas can be problematic and expensive.

Typical nitrogen gas supply methods include high pressure cylinders, liquid mini tanks or bulk storage vessels. However, each of these options introduce a range of problems that need to be solved. If you are already using nitrogen in your processes you may be experiencing some of these problems.

When considering nitrogen supplies, a reliable vendor must be outsourced and valuable space in or outside the company premises needs to be assigned for gas storage. Procedures have to be established to monitor and manage the gas supply and arranging deliveries and payment must also be considered.

Additionally, safety and handling concerns need to be taken into account. The cost of addressing these logistical issues can be high and difficult to forecast, while the price of gas and supplier rates change continually. The environmental impact of truck based deliveries is another important consideration for carbon footprint reduction.

Gardner Denver's range of nitrogen gas generation systems offer ideal solutions enabling you to produce your total demand for food grade nitrogen gas on your premises and under your control. This way, you can generate as much or as little nitrogen as you need, at a fraction of the cost of having gas delivered by an external supplier.

"Maintaining a ready supply of nitrogen gas can be problematic and expensive."

Why gas generation is best

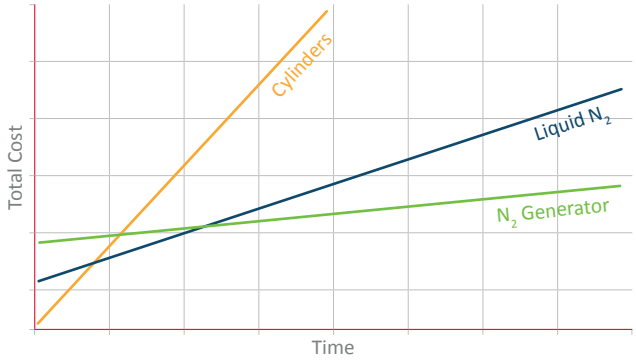
Insourcing your nitrogen supplies can significantly reduce your operational costs.

The range of nitrogen generators from Gardner Denver use pre-treated air from a standard industrial compressor which is essentially “sieved” so that oxygen and other trace gases are removed while nitrogen is allowed to pass through to the application. Air separation is not a new idea, but the levels of efficiency achieved by Gardner Denver's nitrogen generators are now higher than ever thanks to radical Pressure Swing Adsorption (PSA) designs and control systems that maximize gas output and reduce air consumption.

A nitrogen generation system can reduce costs by up to 90% when compared to traditional methods of supply. If a company using liquid nitrogen was to convert to gas generation technology, the new system could typically be expected to pay for itself in less than two years. For a company switching from cylinders, the payback period might even be one year or less.

The new systems can also make the workplace considerably safer for employees, eliminating the safety risks of storing, handling and changing heavy high-pressure cylinders.

Payback can be less than 1 year when compared to cylinders, 2 to 3 years when compared to liquid nitrogen.



“A nitrogen generation system can reduce costs by up to 90%.”

On-site nitrogen generation made easy by Gardner Denver

Whether or not you have an existing source of compressed air, Gardner Denver provides all you need to set up your on-site nitrogen generation system and benefit from its ongoing, reliable operation.

Using high quality compressed air to supply the nitrogen generators ensures long and trouble-free service and guarantees optimum performance. If you already have an existing compressor with spare capacity we can help you develop a system around it.

All of our compressors are designed and manufactured to provide our customers with a reliable source of compressed air with low energy cost and high performance. It is important that nitrogen generators are provided with the right quality compressed air. Gardner Denver provide a wide range of purification products such as the coalescing filters and adsorptions dryers required to purify your compressed air to the levels required by your nitrogen generator.

Guaranteed air quality:

Dewpoint:	-40°F PDP
Particulate:	<0.1 micron
Oil:	<0.008ppm

Global support delivered locally

Our commitment to customer satisfaction incorporates a wide range of support services including product selection, installation, commissioning, preventative maintenance, validation and product monitoring.

Technical data - GDN2 Series

Performance data is based on 100 psi g (7 bar g) air inlet pressure and 66 - 77°F (20 - 25°C) ambient temperature. Consult Gardner Denver for performance under other specific conditions.

Model	Nitrogen flow rates cfm (m^3/hr) vs Purity (oxygen content)											
	unit	10ppm	100ppm	250ppm	500ppm	0.10%	0.50%	1.00%	2.00%	3.00%	4.00%	5.00%
GDN20033	cfm	0.3	0.7	0.9	1.1	1.4	2	2.5	3.5	4.2	4.9	5.5
	m^3/hr	0.55	1.2	1.5	1.9	2.4	3.4	4.3	5.8	7.2	8.4	9.4
GDN20072	cfm	0.7	1.4	1.9	2.3	2.8	4.1	5	6.8	8.4	9.8	11.1
	m^3/hr	1.2	2.4	3.2	3.9	4.7	6.9	8.5	11.6	14.3	16.7	18.8
GDN20090	cfm	0.9	1.9	2.5	3.1	3.8	5.6	6.8	8.9	11	12.8	14.4
	m^3/hr	1.5	3.2	4.2	5.3	6.5	9.5	11.5	15.2	18.7	21.7	24.5
Outlet pressure	psi g	81	78	86	83	81	83	87	87	84	83	81
	bar g	5.6	5.4	5.9	5.7	5.6	5.7	6	6	5.8	5.7	5.6

m^3 reference standard = 20°C, 1013 millibar(a), 0% relative water vapor pressure.

Inlet Parameters

Inlet Air Quality	ISO 8573-1: 2010 Class 2.2.2 (2.2.1 with high oil vapor content)
Inlet Air Pressure Range	87 - 188 psi g 6 - 13 bar g

Electrical Parameters

Supply Voltage	115 / 230 ± 10% V ac 50/60Hz
Power	80 W
Fuse	3.15A (Anti surge (T), 250v, 5 x 20mm HBC, Breaking Capacity 1500A @ 250v, UL Listed

Environmental Parameters

Ambient Temperature	41° - 122°F 5° - 50°C
Humidity	50% @ 104°F (80% MAX ≤ 87.8°F)
IP Rating	IP20 / NEMA 1
Pollution Degree	2
Altitude	Altitude < 6562ft (2000m)
Noise <80 dB (A)	<80 dB (A)

Port Connections

Air Inlet	G½"
GDN2 Outlet to Buffer	G½"
GDN2 Inlet from Buffer	G½"
GDN2 Outlet	G½"

Weights and Dimensions

Model	Height	Width	Depth	Weight
	(in)	(in)	(in)	(lb)
GDN20033	40.70866	17.7165	18.5433	216.053
GDN20072			25.1969	319.67
GDN20090			31.8504	432.106

Packed Weights and Dimensions

Model	Height	Width	Depth	Weight
	(in)	(in)	(in)	(lb)
GDN20033	24.0945	58.66142	37.4016	383.604
GDN20072				487.222
GDN20090				599.657

Performance data is based on 100 psi g air inlet pressure and 66°F - 77°F ambient temperature. Consult Gardner Denver for performance under specific conditions.

Model	Nitrogen flow rates cfm vs Purity (oxygen content)												
	5ppm	10ppm	50ppm	100ppm	250ppm	500ppm	0.10%	0.40%	0.50%	1%	2%	3%	4%	5%
GDN2-20P	2.06	2.65	3.94	4.70	5.70	6.53	7.29	9.82	10.41	12.53	14.89	17.53	18.18	19.83
GDN2-25P	3.12	4.00	5.94	7.06	8.59	9.82	10.94	14.77	15.65	18.83	22.36	26.30	27.31	29.78
GDN2-35P	4.12	5.30	7.88	9.41	11.41	13.06	14.59	19.65	20.83	25.07	29.78	35.07	36.37	39.67
GDN2-45P	5.18	6.65	9.88	11.77	14.30	16.36	18.24	24.60	26.07	31.37	37.25	43.84	45.49	49.61
GDN2-55P	6.18	7.94	11.83	14.12	17.12	19.59	21.89	29.48	31.25	37.61	44.67	52.61	54.56	59.50
GDN2-60P	6.82	8.82	13.12	15.65	1.35	21.71	24.24	32.66	34.66	41.67	49.49	58.32	60.44	65.97
GDN2-65P	7.83	10.06	15.00	17.89	21.71	24.83	27.72	37.37	39.61	47.61	56.56	66.62	69.09	75.39
GDN2-75P	8.53	10.94	16.30	19.48	23.66	27.07	30.19	40.67	43.14	51.91	61.62	72.63	75.27	82.10
GDN2-80P	9.48	12.18	18.12	21.65	26.25	30.07	33.54	45.20	47.91	57.68	68.51	80.69	83.63	91.22

m^3 reference standard 20°C, 1013 millibar(a), 0% relative water vapor pressure.

Inlet Parameters

Inlet Air Quality	ISO 8573-1: 2010 Class 2.2.2 (2.2.1 with high oil vapor content)
Inlet Air Pressure Range	72.5 - 188.5 psi g

Electrical Parameters

Generator Supply	100 - 240 +/- 10% Vac 50/60Hz
Power Range	55 W
Fuse	3.15 A (Anti Surge (T), 250v, 5 x 20mm HBC, Breaking Capacity 1500A @ 250v, IEC 60127, UL R/C Fuse)

Environmental Parameters

Ambient Temperature	5-50°C
Humidity	50% @ 104°F (80% @ MAX @ 87.8°F)
IP Rating	IP20 / NEMA 1
Pollution Degree	2
Installation Category	II
Altitude	< 6562ft (2000m)
Noise <80 dB (A)	<80 dB (A)

Port Connections

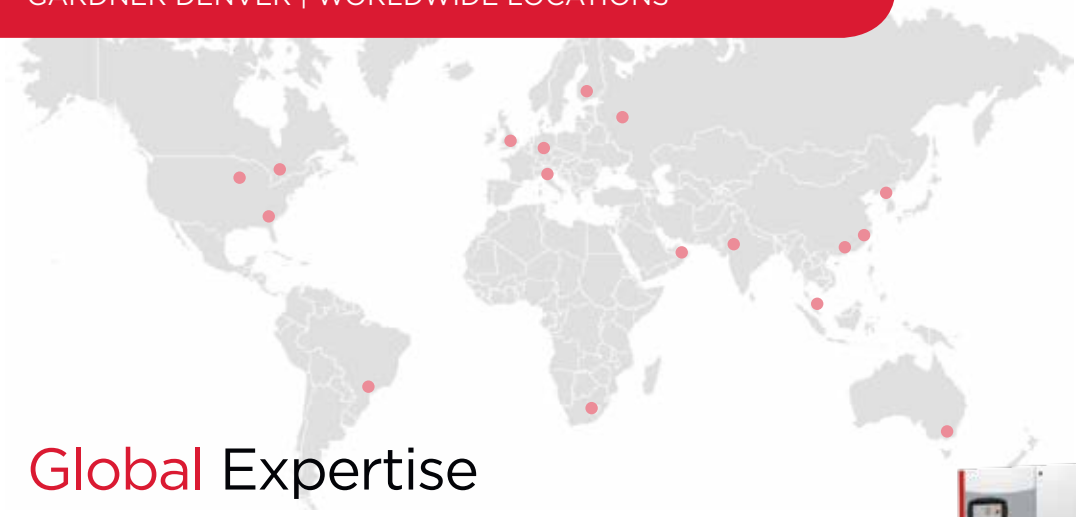
Air Inlet	G1
GDN2 Outlet to Buffer	G1
GDN2 Inlet from Buffer	G1
GDN2 Outlet	G1

Weights and Dimensions

Model	Height	Width	Depth	Weight
	(in)	(in)	(in)	(lb)
GDN2-20P	74.57	21.65	34.69	659.18
GDN2-25P			41.34	846.58
GDN2-35P			48	1033.97
GDN2-45P			54.64	1219.16
GDN2-55P			61.30	1406.55
GDN2-60P			67.95	1591.74
GDN2-65P			74.60	1779.13
GDN2-75P			81.26	1966.52
GDN2-80P			87.91	2151.71

Packed Weights and Dimensions

Model	Height	Width	Depth	Weight
	(in)	(in)	(in)	(lb)
GDN2-20P	28.70	78.74	42.91	878.32
GDN2-25P			49.60	1092.17
GDN2-35P			56.30	1279.56
GDN2-45P			63.00	1513.25
GDN2-55P			69.69	1724.90
GDN2-60P			76.18	1978.43
GDN2-65P	32.75		82.68	2198.89
GDN2-75P			89.57	2410.53
GDN2-80P			96.26	2615.57



Global Expertise

The GD rotary screw compressor range from 2.2 – 500 kW, available in both variable and fixed speed compression technologies, are designed to meet the highest requirements which the modern work environment and machine operators place on them.

The oil-free EnviroAire range from 15 – 315 kW provides high quality and energy efficient compressed air for use in a wide range of applications. The totally oil-free design eliminates the issue of contaminated air, reducing the risk and associated cost of product spoilage and rework.

A modern production system and process demands increasing levels of air quality. Our complete **Air Treatment Range** ensures the highest product quality and efficient operation.

Compressor systems are typically comprised of multiple compressors delivering air to a common header. The combined capacity of these machines is generally greater than the maximum site demand. To ensure the system is operated to the highest levels of efficiency, the **GD Connect** air management system is essential.

Gardner Denver

www.gardnerdenver.com/gdproducts

For additional information please contact Gardner Denver or your local representative.

Specifications subject to change without notice.

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